

**REMARKS**

The specification has been amended to correct errors of a typographical and grammatical nature. Due to the number of corrections thereto, applicants submit herewith a Substitute Specification, along with a marked-up copy of the original specification for the Examiner's convenience. The substitute specification includes the changes as shown in the marked-up copy and includes no new matter. Therefore, entry of the Substitute Specification is respectfully requested.

The abstract has also been amended to more clearly describe the features of the present invention.

Entry of the preliminary amendments and examination of the application is respectfully requested.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (503.39842X00) and please credit any excess fees to such deposit account.

Respectfully submitted,

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Abstract of the Disclosure:

A composite panel of an element member in which having a non-adhesion portion is mounted on a stationary table and a bending table and is fixed thereto by vacuum adsorption pads. An upper portion bending table is mounted on a face sheet of providing the non-adhesion portion. The face sheet is adsorbed according to secured using the vacuum adsorption pad on the bending table. The bending table is rotated, then so that the face sheet is bent. A The center core member is cut with a V-shape V-shape. An adhesion agent is coated. Next, by rotating the lower bending table, the other a face sheet is bent and the center core member are bent so that the core member is adhered to the upper face sheet. Without causes of causing a gap between a face sheet and a center core member and a partial contact, an integral bending processing of a flat sheet shape composite panel can be realized. In addition to this, in a to strength assurance adequate strength in a bending processing portion of the composite panel, it is unnecessary to provide a separate member and the like.

[Selection Figure] Fig. 1



503.34842X06  
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Title of the Invention:

COMPOSITE PANEL AND BENDING PROCESSING METHOD OF THE SAME

Background of the Invention:

5 [Technical Field]

The present invention relates to a composite panel and to a bending processing method of a composite panel.

Dealing an angular bend

[Prior Art]

In the prior art, in a composite panel [and] a bending processing method of [a] composite panel, two face sheets and a center core member are positioned [along to] the [above] two face sheets. Next, using a monopoly type die having a pair of a convex type and a concave type, and a pressing device, the two face sheets and the center core member are adhered and fixed. Or, for example, [covering] a monopoly die having a convex type die, the two face sheets and the center core member [using] a non-ventilation characteristic sheet, [and] by evacuating an inner portion of the sheet, the two face sheets and the center core member are adhered and fixed.

20 In another bending processing method of a composite panel,

as shown in Japanese application utility model publication No.

Hei 2-8567, from a side of a face sheet [for forming] an inner periphery, after [a] bending, portion of the composite panel, the face sheet which forms [a side of an] outer periphery after the

25 bending [portion] of the composite panel is left, a V-shaped groove

is processed, along [to] an apex of this groove, the face sheet [in] the outer periphery [side] of the composite panel is [carried] subjected to

[out the] bending processing.

-described

In the above [stated prior art] techniques relating to [the] a bending processing method of [the] composite panel, [separating] while still separate from the center core member, the face sheet is transformed [in] a predetermined bending shape, and [by combining] the face sheet, with the center core member, since [the] face sheet and the center core member [are] adhered, and fixed, [it is relied on] a hand working using a general purpose machine.

Further, the face sheet and the center core member, which are transformed individually using [the] monopoly-type die having the convex type) and [the] concave type) (a monopoly type having an upper portion monopoly die and a lower portion monopoly die) and [the] pressing device, or for example [the] concave type monopoly die) (the lower monopoly die), [the] face sheet and the center core member] are covered by [the] non-ventilation characteristic sheet member, and the inner portion of the sheet member and the face sheet and the center core member are adhered, and fixed,

A mutual gap and [a] partial contact (a local application of pressure) between the center core member, the face sheet and the monopoly die, [generate] an adhesion failure and a buckling in [a] thickness direction of the center core member, [generate and] [then] a strength of the face sheet [becomes lower]. Further, in the face sheet in which [the] partial contact (the local application of pressure) generates a recess portion [and] a damage and the like, [as a result an] outer appearance of the face sheet becomes unsightly [is damaged].

**Summary of the Invention:**

An object of the present invention is to provide [to realize] <sup>to</sup>  
 Having an angular bend producing such  
 a composite panel, and a bending processing method of a composite  
 in which the panel [without an] occurrence of [the] gap or [the] partial contact

5. (the local application of pressure) between the face sheet and  
 is eliminated, so as an angular  
 the center core member, [and] to provide, [to realize a bending]  
 composite panel having a high strength.

Another object of the present invention to provide a <sup>is</sup>  
 Having an angular bend producing such  
 composite panel, and a bending processing method of a composite  
 the panel is produced need for a  
 10. panel wherein without the monopoly die for [use in] every bending  
 ; and in which both Having an angular bend  
 configuration (each) a composite panel, and a bending processing  
 in such a way as an angular  
 of a composite panel can be realized [and] to provide [a bending]  
 composite panel having a high strength.

- The above-stated objects of the present invention can be  
 attained by a composite panel comprising a first flat face sheet,  
 and a second flat face sheet, a flat center core member joined to  
 the first flat face sheet and the second flat face sheet,  
 characterized in that an end portion of the second flat face  
 so as to be an  
 sheet is positioned shorter than end portion of the first flat  
 surface of the  
 20. face sheet, and the center core member [in a side of] the end  
 portion [of] the [first] flat face sheet is not joined to the [first] second  
 prior to the bending processing  
 flat face sheet.

- The above-stated objects of the present invention can be  
 attained by a bending processing method of, a composite panel  
 of  
 25. having the steps forming a first flat face sheet, a second flat  
 to be to  
 face sheet, and a flat center core member joined to the first flat  
 face sheet and the second flat face sheet, preparing a composite

in a portion of the second flat face sheet  
panel, which is not joined to the flat center core member [in a]  
composite panel by

[side of an] end portion of the first face sheet, installing the

first flat face sheet [on] a stationary table and a first bending

table, so as to extend along

[to direct to] the stationary table and the first bending

table, contacting a first bending table [to] the non-joined region

of the second flat face sheet from [an outer portion of] the

composite panel, [in] a condition in which the stationary table

is fixed to the composite panel and the second bending table

is fixed to the non-joined region of the second flat face sheet [in]

10 rotating the second bending table in a direction to separate

from the center core member], removing the flat center core member

at the

[in] a position in which the composite panel is bent [with] a V-shape

coating an adhesion agent to [one] of the second flat face sheet

and an opposed face [to] the flat center core member [in] and [to] adhere

15 the flat center core member to the second flat face sheet [in]

rotating the first bending table.

accordance with

The composite panel in the present invention can be

applied to a polystyrene foam panel and a soldering honeycomb

panel. The material of the face sheet can be [employed the] metal,

20 such as aluminum, a FRP (Fiber Reinforced Plastic) and [the] paper,

etc. The material of the center core member can be [employed]

a honeycomb-shaped paper, a honeycomb-shaped FRP (Fiber Reinforced

Plastic), and a foam material, such as vinyl chloride, phenyllic

acid (phenol), acrylic acylate, urethane. The joining [manner]

25 of the center core member with the face sheet can be [employed]

[the] soldering [manner], [the] adhesion [manner], and [the] welding

[manner], etc. /

*the*  
**Brief Description of Drawing:**

Fig. 1 is a longitudinal cross-sectional view showing an initial state of an essential portion of a bending processing device having a composite panel [of] one embodiment [according to] 5 the present invention;

Fig. 2 is a longitudinal cross-sectional view showing a midway point <sup>the</sup> of [a] bending processing [in] the bending processing device of Fig. 1;

Fig. 3 is a longitudinal cross-sectional view showing a state [in which] the bending processing [is proceeded from] Fig. 10 10 following the step shown in 2 [in] the bending processing device of Fig. 1;

Fig. 4 is the longitudinal cross-sectional view showing a state [in which] the bending processing [is proceeded from] Fig. 15 15 following the step shown in 3 [in] the bending processing device of Fig. 1;

Fig. 5 is a longitudinal cross-sectional view showing a state [in which] the bending processing [is proceeded from] Fig. 20 20 following the step shown in 4 [in] the bending processing device of Fig. 1;

Fig. 6 is a [whole] perspective view showing the bending processing device of Fig. 1;

Fig. 7 is a front view showing an end portion of a bending table of the bending processing device of Fig. 1; and

Fig. 8 is a longitudinal cross-sectional view of the end portion of a bending table of the bending processing device of Fig. 7.

**Description of the Invention:**

*having an angular bend*  
A composite panel and a bending processing of a composite

according to panel [of] one embodiment [according to] the present invention will be explained [referring] to [from] Fig. 1 to Fig. 5. Firstly, [a] the construction [of an] element material of a composite panel for carrying out a bending processing will be explained. In Fig.

- 5 1, the composite panel to be subjected to [the] bending processing comprises a face sheet 11, which [becomes] a side [of] an outer face of the panel at the [use] time, a face sheet 12, which [becomes] a side [of] an inner face, [in the use] time, and a center core member 13, which is arranged between the face sheet 11 and the face sheet 12. These
- 10 three members (the face sheet 11, the face sheet 12, and the center core member 13) are constituted as one body [according] [to] an adhesion [manner].

Each of the face sheet 11 and the face sheet 12 is formed [by] of a metal sheet, such as an aluminum sheet, a steel sheet and the like [and] further, each of the face sheet 11 and the face sheet 12 [is] formed by the above-stated metal sheet and a vinyl chloride adhesion dressing sheet or a melanin resin dressing sheet etc. [being put to adhere together] by [a] coating, and [a] thickness of the face sheet 11 or the face sheet 12 is about 0.5 mm - 2.0 mm.

The center core member 13 is formed by a paper center core member, such as a roll core and a paper honeycomb; and, further, the center core member 13 is [formed by] a urethane-foam resin, which is filled up in [a] cells of the [above stated] paper center core member, to [aim at] heat insulation and [a] sound shielding [and] A [a] resilient urethane-foam resin [etc], and [a] thickness the center core member 13 is about 20 mm - 50 mm.

The entire surface [is] in contact with  
 [All faces] of the face sheet 11 [and] the center core member  
 13 [are] adhered [substantially] to the [face sheet 11]. The [meaning]  
 of the [all faces] will be made clear [according to] the following  
 explanation of the adhesion of the face sheet 12 [and] the center  
 core member 13. The face sheet 12 and the center core member  
 13 are adhered only at an adhesion portion 12b, but are not adhered  
 at a remaining non-adhesion portion 12a. The non-adhesion of the  
 portion 12a can be obtained by avoiding [a] coating of [an] adhesion  
 agent. The non-adhesion portion 12a is a side [in] which a bending  
 processing is carried out.

A length of the face sheet 12 is shorter than [a] length  
 of the face sheet 11 [with] a length 12c. The face sheet 12 is  
 bent to form an inner side of the [bending]. Accordingly, when  
 the bending processing of the composite panel is carried out,  
 between the face sheet 11 and the face sheet 12, a peripheral  
 length difference 12c<sub>1</sub> generated. The inner side face sheet 12  
 is shorter than the face sheet 11 [with a] peripheral length  
 difference 12c.

Next, the bending processing method of the composite  
 panel will be explained. Fig. 1 shows a state in which the above-  
 stated composite panel is set on a bending processing device.  
 Firstly, the composite panel is laid on a stationary table 30  
 and a bending table 40 of the bending processing device. The  
 faces of the stationary table 30 and the bending table 40 are  
 positioned in the horizontal [same] plane. [Forming the face sheet]  
 [12 in an upper face], the composite panel is laid on the stationary  
 table 30 and the bending table 40. The side of the non-adhesion

is located, on portion 12a [to] which the bending processing is carried out, is located [laid] on the bending table 40.

Next, [according to] vacuum pads 31 and 41 of a vacuum adsorption device, which is installed on the stationary table

5 30 and the bending table 40, the face sheet 11 is adsorbed and [in position on these tables] lowered into contact with fixed. Next, a bending table 50 is [descended and is laid on] the face sheet 12 [of] the non-adhesion portion 12a.

10 Next, [according to] a vacuum pad 51 of the vacuum adsorption device, which is installed on the bending table 50, the end of the bending table 50 to the bending table 50, the face sheet 12 is adsorbed and fixed. The vacuum adsorption pads 31, 41, and 51 are installed with a predetermined interval along [to] the longitudinal direction (an) axial direction of (a) the center of the bending) of the stationary table 30 and the bending table 40, and the bending table 50.

15 Next, as shown in Fig. 2, by rotating the bending table 50, [the] [which forms] in an upper portion, the face sheet 12 [of] the non-adhesion portion 12a is bent in the upper [portion]. In this embodiment

according to the present invention, since the face sheet 12 is at a 90 degree angle [the] [rotated to be] bent [rectangular], [a] contact face of the bending table 50 is [in] to the plane of free sheet 12.

20 The bending table 50 is positioned only at the edge non-adhesion portion 12a. An [end] portion of the bending table

around which the bending occurs [at] 50, is positioned [in] a boundary of the non-adhesion portion 12a and the adhesion portion 12b or [in a side] of the non-adhesion

25 portion 12a, a [little] from the boundary. The [position of the] [edge] [axis] [apex] [end] portion of the bending table 50 becomes a center of the rotation. The [end] [portion of] the boundary side of the bending table 50 is inclined (is abstracted), so as

table 50 is inclined (is abstracted), to not contact [to] the face

sheet 12, during the bending table 50 [is rotated].

Next, as shown in Fig. 3, the center core member 13 is cut off with a V-shaped according to a V-cutting device 60. The V-cutting is carried out to remove only the center core member 13 [by] leaving the face sheet 11. The position of the V-cutting is the bending position. An angle of the V-cutting is the bending angle [and] is a right angle [and] 90 degrees. Using a knife 61 for carrying out the V-cutting, two faces are cut off at the same time. In the V-cutting, under a condition in which the knife 61, such as a router and an end milling [61] is inclined [in] at a predetermined angle, [and] the knife 61 is sent toward a bending line [direction and] the center core member 13 is removed. Since the center core member 13 is formed by [the] paper center core member and [the] member in which a urethane-foam resin is filled up to [the] paper center core member, even if the center core member 13 is left [a little in] the face sheet side, by carrying out the bending processing, the center core member 13 can be crushed.

Next, as shown in Fig. 4, from the upper portion to the non-adhesion portion 12a and the V-cutting portion of the center core member 13, according to an adhesion agent coating device 70, the adhesion agent is coated. [In] this time, since the gap between the face sheet 12 and the center core member 13 becomes large [and then], the adhesion agent coating can be carried out easily.

Next, as shown in Fig. 5, forming an apex of the V-cutting as a center, the bending table 40 is rotated [toward the upper portion,] the face of the bending table 40 [is formed] extends upward using the groove

to the plane of the stationary table 30. With movement <sup>10</sup> surface of the center core member 13 on perpendicularity. According to this, the face in which the adhesion agent has been pressed into contact with the vertically extending portion of the face sheet 12. Further, the inclined faces of the center core member 13 [of the V cutting] are [contacted] together [with].

- 5 [Leaving] this condition, the center core member 13 is maintained <sup>the position of</sup> until [during] the adhesion agent is hardened completely.

Next, after the vacuum of the adsorption pad 51 of the bending table 50 has been released, the bending table 50 is ascended.

- 10 Next, after the vacuum of the adsorption pad 41 of the bending table 40 is released, the bending table 40 is [reversed] to [the] horizontal orientation <sup>rotated back</sup> initial time condition. Next, the composite panel, which has <sup>on</sup> been carried out from [carried out] the bending processing is taken out [in] a side of the bending table 40 [and] the bending processing of the composite panel is completed.

- 15 According to the above bending processing method of the composite panel, without the occurrence of [the] gap [and the] or partial contact (the local application of pressure) between the face sheet 11 and the face sheet 12 and the center core member 13, the bending processing of the composite panel can be carried

- 20 out. Further, in the bending portion, since the face sheet 12 is not separated into two portions, after the bending processing of the composite panel, it is unnecessary to weld the non-adhesion portion 12a and the adhesion portion 12b, using (the) another (separation) member.

- 25 As seen in Fig. 6, the V-cutting device 60 and the coating device 70 of the adhesion agent are installed <sup>on</sup> to a moving body 80. The moving body 80 moves along [to a] longitudinal direction of the

*the*

composite panel. The moving body 80 moves along [to] <sup>the</sup> rails 81, which are mounted on [of] a side face of the bending processing device. The V-cutting device 60 and the adhesion agent coating device 70 are [installed] carried by a lifting lowering, which is carried by the moving body 80 [to an ascending] and [descending] device 83. By selecting [one of] either

5. the V-cutting device 60 [and] the adhesion agent coating device 70, it is possible to [use the] practical use.

Both ends of the bending table 50 are installed [rotatably] on a shaft 53 which is rotatable and is carried freely on an ascending and descending device 55 [through a shaft]

- [53]. The [ascending and descending] device 55 is [ascended] and lowered relative to the rail 81. A reference numeral 56 [is] a drive [machine] for rotation [use].

[A] rotation device of the bending table 40 will be explained [referring] to Fig. 7 and Fig. 8. [To] the both ends of the bending table 40, a semi-circular flange 43 is installed.

15. This flange 43 is supported by plural rollers 45b and 45c, which are installed [to] a frame stand 44. The plural rollers 45b and 45c are installed [in] a circular arc shape. The rollers 45b support a lower face of the flange 43. The rollers 45c contact

20. [to] an upper face of a circular arc-shaped guide rail 43b, which is installed on the flange 43. Further, to the lower face of the bending table 40 [the] circular arc-shaped projection portions are provided with a predetermined interval and are supported by the frame stand 44.

25. To [a] left [portion] and [a] right [portion] of the flange 43, gears 46 are installed. The gear 46 [has] a rotation angle [part] of the bending table 40. [To] the frame stand 44, [the] pinion gears 46b for meshing with the gear 46 are provided. [To] pinion gears

by

46b at [the] both sides are rotated [according to] a single motor

47.

- described

In the above [stated] embodiment according to the present invention, the bending angle is 90 degrees, but in [a] case of,

another angle [suiting to this angle], the V-cutting is carried to provide a groove of the required angle out. For example, an end milling having the same [of a] bending angle [to an] angle forming an axial end and a side face of the end milling is used. Further, even when the angle of the V-cutting is smaller than the bending angle, the center core member can be easily crushed [in general], the bending processing of the composite panel can be carried out.

The adhesion agent can be coated [to] the face sheet 12 [of the side of] the center core member 13. However, when the adhesion agent is coated [to] the V-cutting portion, a high strength can be obtained, it is preferable to [carry out] the coating [to] the center core member 13.

[A] technical range according to the present invention is not limited by the wordings defined in each claim of what is claimed or the wordings stated on the means for solving the problems and further it refers also to the range in which the man belonged in this technical field can be placed easily.

According to the present invention, one face sheet [to] which [a part thereof] is not adhered, is bent, the center core member is removed, next [the] adhesion agent is coated, [next] another face sheet is folded [and] adhered. [The] gap between the face sheet and the center core member [and the] partial contact (the local application of pressure) are [not caused], it is

possible to carry out the bending processing of the composite panel. Since the cutting of the face sheet is unnecessary, but remains continuous, an adequate can be assured the face sheet [continues], [the] strength [assurance] in the bending processing portion [can be obtained].



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